# MANUFACTURING AS THE ENGINE OF GROWTH: EVIDENCE FROM THE MENA REGION

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## ABSTRACT

This study investigates the relationship between manufacturing share in GDP (MVA) and growth for a balanced panel of 13 Middle East and North Africa (MENA) economies over the 1996-2019 period. We examine whether the impact of MVA on growth may change depending on the structural domestic conditions (SDC) including human capital, governance and financial development. Our panel fixed effects threshold estimation results suggest that SDC provides an endogenously estimated threshold for the sensitivity of growth to MVA. Accordingly, manufacturing is the engine of growth for the episodes of SDC exceeding the data-driven estimated threshold levels. We find that SDC, themselves, encourage growth in economies with better SDC, except human capital. The sensitivity of growth to human capital is much higher in less educated labor economies because the marginal contribution of labor is greater for these economies than the others.

**Key words:** Manufacturing, Human Capital, Governance, Financial Development, Panel Threshold Model.

**JEL Classification:** C13, C24, C33, O10, O14, O47

## 1. Introduction

Kaldorian growth laws maintain that manufacturing is the engine of growth. Accordingly, the manufacturing sector absorbs surplus labor from low value-added sectors, exhibits increasing returns to scale, increases the labor and overall productivity (Kaldor, 1966). The literature also suggests that the manufacturing sector provides backward and forward linkages (Thirlwall, 1983; Tregenna, 2009; Gabriel and Ribeiro, 2019), increasing savings and total factor productivity (Su and Yao, 2017). All these arguments make the manufacturing industry the main driving force for growth. In this empirical study, we aim to investigate the relationship between manufacturing and growth for the Middle East and North Africa (MENA) economies.

The bulk of the literature investigates the validity of manufacturing as the engine of growth argument at the national, regional and cross-country levels (Bairam, 1991; Katrakilidis et al., 2013; Guo et al., 2013). McCausland and Theodossiou (2012) reports that the relationship between manufacturing and growth disappears in servicified economies i.e., high services sector share in GDP. On the other hand, Hauge and Chang (2019) remarks that manufacturing has a crucial importance for growth even in servicified economies because the economic activities in the services sector depend on the manufacturing products. In this vein, Hermele (2002) notes that "while we live in the service economy, our industrial goods are produced elsewhere". A recent study by Dasgupta et al. (2017) suggests that the growth impact of manufacturing tends to diminish over time. Haraguchi et al. (2017) notes that manufacturing is still one of the crucially important components of growth before and after the 1990s. McCombie (1982) and Felipe (1998) remark that the relationship between manufacturing and growth incorporates a high degree of complexity that may not be considered as a simple bivariate correlation. All these studies suggest that the investigation of manufacturing-growth relations is still one of the crucially important research topics in development economics literature.

The recent literature emphasizes the importance of structural domestic conditions like human capital, governance and financial development in explaining the relationship between manufacturing and growth. Dunning and Zhang (2008) report that human capital may provide location advantages and lead to higher efficiency seeking investment. Szirmai and Verspagen

(2015) report that the impact of manufacturing on growth is much higher in economies with better educated labor.

According to North (1990, p.3), “institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction”. The conventional theory often maintains that better governance is associated with enhanced legal infrastructure including greater property rights, transparency and accountability. A better institutional environment can not only be considered as an indicator of well-functioning markets but also lower information asymmetries, risks and higher political accountability as suggested by World Trade Organization (2004). North and Thomas (1973) maintain that the fundamental reason for growth differences is related to the institutional environment. Acemoğlu et al. (2005) notes that institutions affect the investment decisions for capital, technology and production.

The conventional literature including Szirmai (2012) and Colacchio and Davanzati (2017) maintains that financial development increases investment and growth by providing efficient allocation of funds along with risk diversification. Hermes and Lensink (2003) suggest that financial development is closely associated with productivity growth, dissemination of technology and accumulation of capital. Bhattacharrya and Hodler (2014) and Beck (2011) suggest that resource abundant economies meet their financial needs with export revenues. According to Mlachila and Ouedraogo (2020), commodity price shocks prevent the development of financial markets in these economies.

All these studies may suggest that structural domestic conditions (SDC) consisting of human capital, governance and financial development are important factors in explaining the evolution of growth. More educated labor, better institutional environment, and financial development may encourage efficiency seeking investment by providing location advantages. In this vein, we may maintain that SDC affects the sensitivity of growth to manufacturing. The bulk of the literature often investigates the relationship between manufacturing and growth by employing conventional estimation procedures like panel least squares and panel fixed/random effects techniques. Such conventional estimation procedures assume that the impact of manufacturing on growth is the same in economies with better and weak SDC. However, this relationship may change depending on the SDC levels. In this context, this study aims to investigate the potential thresholding effect of SDC in explaining the sensitivity of growth to manufacturing. Instead of employing *ad hoc* sample-splitting procedures which maintain that the threshold level is exogenous, this study examines the thresholding effect of SDC by employing data-driven estimation methods. The main aim of this paper is to investigate this important issue empirically for a balanced panel of 13 MENA economies over the 1996-2019 period by employing the panel fixed effects threshold estimation procedure of Hansen (1999).

We find that the sensitivity of growth to manufacturing is not invariant to data driven estimated SDC thresholds. However, these appear to be the case for resource-poor MENA economies. As consistent with an argument that natural resource abundance may prevent the functioning of conventional growth driving channels, our estimation results suggest that SDC, except human capital, do not provide endogenously estimated thresholds in explaining the effect of manufacturing on growth in resource-rich MENA. For resource poor MENA economies, the impact of manufacturing on growth is much higher in economies with better SDC. We also find that direct impacts of SDC, except human capital, on growth are much higher in economies with better SDC. An improvement in human capital leads to growth especially in economies with less educated labor because the marginal contribution of educated labor is much higher in these countries.

The plan for the rest of this paper is as follows. Our country sample and data are introduced in the following Section 2. The empirical methodology is explained and estimation results are reported in Section 3. Section 3.1 explains the empirical methodology. In Section 3.2, we first consider human capital as the thresholding variable in explaining the impact of manufacturing on growth. We investigate the thresholding effect of governance and financial development in Sections 3.3 and 3.4. Finally, we evaluate and synthesize our main findings through concluding remarks in Section 4.

## 2. The Data and Some Descriptive Statistics

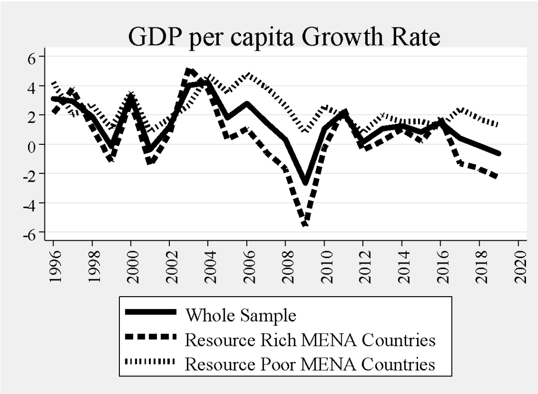
This paper investigates the relationship between manufacturing and growth. We maintain that the impact of manufacturing on growth may change depending on the SDC including human capital, governance and financial development. To this end, our sample contains annual observations for 13 Middle East and North Africa (MENA) economies (Algeria, Bahrain, Egypt, Iran, Israel, Jordan, Kuwait, Morocco, Qatar, Saudi Arabia, Tunisia, Turkey and United Arab Emirates) over the 1996-2019 period. Considering the heterogeneity in resource endowments, it may be plausible to divide the sample as resource rich[1] and poor MENA economies. The choice of the sample is mainly determined by data availability to obtain a balanced data which is required to employ the Hansen (1999) panel fixed effects threshold estimation procedure.

In this study, Growth is the log. difference of real GDP per capita and the data are from the United Nations Conference on Trade and Development (UNCTAD) database. MVA is the manufacturing value added share in GDP and the data are from the UNCTAD database. Oil_Price is the log. the difference between the crude oil spot price and the data are taken from World Bank Commodity Price data. HC is a human capital index constructed based on the years of schooling and returns to education and the data are taken from the Penn World Table (Feenstra et al., 2015) database. FD is a financial development index that considers not only size but also liquidity of financial institutions and markets (Svirydzenka, 2016). This index lies between zero and one, with higher values denoting better financial development. GOV is the institutional quality and governance variable measured by the World Bank Governance Indicators (WBGI). WBGI considers the six aspects of institutional quality and governance including voice and accountability, political stability and violence, government effectiveness, regulatory quality, rule of law and control of corruption (Kaufmann et al., 2005). These variables are standardized around zero mean and unit standard deviation to have values between -2.5 and 2.5 with higher values denoting better institutional quality. We use the first principle component[2] of the six variables as a proxy for aggregate institutional quality and governance.

[1] The members of the Gulf Cooperation Council (GCC) and Organization of the Petroleum Exporting (OPEC) countries are considered as resource rich MENA economies and these are Algeria, Bahrain, Iran, Kuwait, Qatar, Saudi Arabia and the United Arab Emirates. The rest of the sample is contained in resource poor MENA economies.

[2] The principal component analysis aims to reduce the dimension of the data by retaining the variation and linear combinations of the variables.

**Figure 1:** Growth in MENA




*Source:* Author's own calculations based on data from UNCTAD.

Figure 1 plots the evolution of mean real GDP per capita growth in MENA during the 1996-2019 period. The average growth rate is around 1.3% for the whole sample, 0.4% for the resource rich and 2.3% for the resource poor MENA economies over the sample period. As compared to resource-poor economies, growth tends to be much lower in resource-rich MENA. This is consistent with "resource curse" explanations maintaining natural resource abundant economies experiencing lower growth.

**Table 1:** Some Descriptive Statistics

| | Growth | MVA | GOV | FD | HC | Oil_Price |
|---|---|---|---|---|---|---|
| | *Whole Sample* | | | | | |
| Mean | 1.321 | 13.730 | 0.778 | 0.373 | 2.355 | 55.288 |
| Median | 1.651 | 14.623 | 0.775 | 0.390 | 2.273 | 53.098 |
| St.Dev. | 4.026 | 5.179 | 1.645 | 0.131 | 0.473 | 29.823 |
| CoV | 3.048 | 0.377 | 2.115 | 0.352 | 0.201 | 0.539 |
| | *Resource Rich MENA* | | | | | |
| Mean | 0.444 | 9.874 | 0.669 | 0.371 | 2.304 | 55.288 |
| Median | 0.490 | 9.833 | 1.023 | 0.409 | 2.262 | 53.098 |
| St.Dev. | 4.664 | 3.630 | 1.835 | 0.131 | 0.312 | 29.823 |
| CoV | 10.502 | 0.368 | 2.744 | 0.354 | 0.136 | 0.539 |
| | *Resource Poor MENA* | | | | | |
| Mean | 2.344 | 18.229 | 0.905 | 0.374 | 2.414 | 55.288 |
| Median | 2.325 | 17.940 | 0.717 | 0.365 | 2.312 | 53.098 |
| St.Dev. | 2.810 | 2.259 | 1.386 | 0.131 | 0.604 | 29.823 |
| CoV | 1.199 | 0.124 | 1.532 | 0.351 | 0.250 | 0.539 |

**Note(s):** St. Dev. and CoV represent, respectively, the standard deviation and coefficient of variation (standard deviation over the mean) for the corresponding variable.

*Source:* Author's own calculations based on data from UNCTAD, World Bank Governance Indicators, Svirydzenka (2016), Penn World Table and World Bank Commodity Price.

Table 1 reports some descriptive statistics for our variables of interest. Accordingly, the average growth rate is much higher in resource poor MENA economies. However, the standard deviation of growth is much higher in resource rich MENA countries. This is consistent with evidence that natural resource endowments expose these economies to fluctuations in commodity prices and lead them to have volatile growth. The mean of manufacturing share in GDP (MVA) is around 13% for the whole sample, albeit it is much higher and less volatile in resource poor economies. This appears also to be the case for the governance (GOV). The mean of financial development index (FD) and human capital (HC) are, respectively around 0.4 and 2.4 for the whole sample, albeit they are almost the same in resource rich and poor MENA economies.

## 3. Empirical Methodology and Estimation Results

### 3.1. Empirical Methodology

To investigate the relationship between manufacturing and growth, we consider the following benchmark equation:

$$GDPpc_{it}=\alpha_i+\alpha_1 GDPpc_{i,t-1}+\alpha_2 MVA_{it}+\alpha_3 Oil\_Price_t+\alpha_4 SDC_{it}+u_{it} \quad (1)$$

In Eq. (1), the subscript i and t represent country and time, GDPpc is the natural logarithm of real GDP per capita, MVA is manufacturing share in GDP, Oil_Price is the log. the difference between crude oil spot price and SDC is the structural domestic conditions including human capital (HC), financial development (FD) and the aggregate institutional quality and governance (GOV). The evolution of income per capita may not be independent of its own recent past, therefore eq. (1) includes also the lagged GDPpc.

A positive coefficient for MVA in Eq. (1) suggests that manufacturing is the engine of growth. Eq. (1) maintains that the impact of MVA on growth is invariant to the SDC. However, the relationship between MVA and growth can be sensitive to the prevailing SDC. SDC may provide data-driven estimated thresholds by dividing the whole sample into observations with weaker and stronger SDC. The impact of SDC on growth may also change depending on the level of SDC. The literature often considers the nonlinearity and/or threshold issues either by employing some interaction specifications or *ad hoc* sample splitting procedures which maintain that the threshold level is exogenous. Alternatively, the threshold SDC levels for the impacts of SDC and MVA on growth may better be investigated by employing data-driven estimation procedures. To our knowledge, this is the first study that investigates whether the prevailing SDC may provide an endogenous threshold for the effects of SDC and MVA on growth. In this context, we examine this important issue for a balanced panel of MENA by employing panel fixed effects threshold procedure[3] of Hansen (1999).

To investigate whether prevailing SDC provides a data-driven estimated threshold for the effects of SDC and MVA on growth, we consider the following equation:

$$GDPpc_{it} = \alpha_i + \alpha_1 GDPpc_{i,t-1} + \alpha_2 MVA_{it}(SDC_{it} \leq \lambda) + \alpha_3 MVA_{it}(SDC_{it} > \lambda) + \alpha_4 SDC_{it}(SDC_{it} \leq \lambda) + \alpha_5 SDC_{it}(SDC_{it} > \lambda) + \alpha_6 Oil\_Price_t + u1_{it} \quad (2)$$

Alternatively, eq. (2) can also be written as:

$$GDPpc_{it} = \alpha_i + \alpha_1 GDPpc_{i,t-1} + \alpha_6 Oil\_Price_t + \begin{cases} \alpha_2 MVA_{it} + \alpha_4 SDC_{it} & \text{if } SDC_{it} \leq \lambda \\ \alpha_3 MVA_{it} + \alpha_5 SDC_{it} & \text{if } SDC_{it} > \lambda \end{cases} + u1_{it} \quad (3)$$

$$GDPpc_{it} = \alpha_i + \alpha_1 GDPpc_{i,t-1} + \alpha_6 Oil\_Price_t + \{\alpha_2 MVA_{it} + \alpha_4 SDC_{it} \;\; if\ SDC_{it} \leq \lambda \;\; \alpha_3 MVA_{it} + \alpha_5 SDC_{it} \;\; if\ SDC_{it} + u1_{it} \quad (3)$$

In equations (2) and (3), λ is the data-driven estimated threshold value for the corresponding SDC. The observations in the sample are divided into the low and high regimes based on this threshold value. For instance, if SDC ≤ λ the estimated coefficients belong to the low regime, i.e., weaker SDC observations. Otherwise, if SDC > λ, the estimated coefficients represent the high regime i.e., stronger SDC observations. The low and high regimes are differentiated from each other with different slope parameters.

[3] Yu and Phillips (2018) show that “both the threshold point and the threshold effect parameters are . . . identified without the need for instrumentation” (p. 50). Therefore, we may plausibly maintain that our estimations are valid even under the potential endogeneity of variables.

The first step of panel threshold estimation procedure consists of the elimination of fixed effects by de-meaning the country-specific characteristics. Then, the observations are sorted ascendingly based on the threshold variable. After trimming the smallest and largest 5% of the observations, we search for the threshold by treating the rest of all observations as a potential candidate. For each candidate, we employ panel least squares to de-meaned sample and select the threshold that gives the minimum sum of squared residuals.

Under the null hypothesis that $\alpha_2 = \alpha_3$ and $\alpha_4 = \alpha_5$ in Eq.s (2) and (3), there are no significant thresholds for the effect of SDC and we obtain the linear model given by Eq. (1). After finding a statistically significant thresholding effect of SDC, the regime-dependent coefficients are estimated by employing the panel fixed effects procedure. It is also important to determine the number of thresholds in the estimated model. Our preliminary results suggest not to reject the null hypothesis that two thresholds are insignificant for all the specifications considered in this paper. The trimming parameter for the Hansen method is set to be 0.05 at both ends of the threshold variable.

### 3.2. Estimation Results: Thresholding Effect of Human Capital

We first proceed with the investigation of whether human capital (HC, measured based on the years of schooling and returns to education) provides a data driven estimated SDC threshold for the effects of HC and MVA on growth. We study the potential thresholding effect of human capital by treating the rest of the SDC variables (GOV and FD) as regime independent variables. To this end, we consider the following equation:

$$GDPpc_{it}=\alpha_i+\alpha_1 GDPpc_{i,t-1}+\alpha_2 MVA_{it}(HC_{it}\leq\lambda)+\alpha_3 MVA_{it}(HC_{it}>\lambda)+\alpha_4 HC_{it}(HC_{it}\leq\lambda)+ \alpha_5 HC_{it}(HC_{it}>\lambda)+\alpha_6 Oil\_Price_t+\alpha_7 FD_{it}+\alpha_8 GOV_{it}+e1_{it} \quad (4)$$

**Table 2:** Thresholding Effect of Human Capital (HC)

| | Whole Sample | Resource Rich MENA | Resource Poor MENA |
|---|---|---|---|
| | Eq. (4.1) | Eq. (4.2) | Eq. (4.3) |
| λ | 2.241 | 2.694 | 1.661 |
| Threshold $F_B$[.] | 12.88[0.00] | 16.17[0.00] | 5.24[0.00] |
| $MVA_{it}$ ($HC_{it} \leq \lambda$) | -0.001 (0.001) | -0.001 (0.002) | -0.005 (0.006) |
| $MVA_{it}$ ($HC_{it} > \lambda$) | 0.003* (0.002) | 0.012* (0.007) | 0.003* (0.001) |
| $HC_{it}$ ($HC_{it} \leq \lambda$) | 0.007 (0.020) | 0.052** (0.027) | 0.133* (0.084) |
| $HC_{it}$ ($HC_{it} > \lambda$) | -0.018 (0.016) | -0.016 (0.027) | 0.050** (0.025) |
| $GDPpc_{i,t-1}$ | 0.935*** (0.020) | 0.814*** (0.035) | 0.895*** (0.032) |
| $Oil\_Price_t$ | 0.020** (0.008) | 0.019* (0.011) | 0.013* (0.008) |
| $GOV_{it}$ | 0.009* (0.005) | 0.016** (0.007) | 0.007 (0.007) |
| $FD_{it}$ | 0.016 (0.039) | -0.121** (0.060) | 0.214*** (0.050) |
| Constant | 0.607*** (0.162) | 1.763*** (0.313) | 0.669** (0.218) |
| Statistics | N=13 NT=312 $R^2$=0.95 F=677.2[0.00] | N=7 NT=168 $R^2$=0.91 F=189.9[0.00] | N=6 NT=144 $R^2$=0.98 F=955.0[0.00] |

**Notes:** $F_B$ is the bootstrapped F-test based on 1000 replications to test the statistical insignificance of the threshold level and [.] is the p-value of the test. The values in parentheses are the standard errors. *, ** and ***, respectively, denote significance at 10%, 5% and 1% levels. N and NT are, correspondingly, the numbers of countries and the effective number of observations.

Equations (4.1), (4.2) and (4.3) in Table 2 report the estimation results of Equation (4), respectively, for the whole sample, resource-rich and poor MENA economies. According to the results by Table 2, human capital (HC) provides a data-driven estimated threshold for the impacts of MVA and HC on growth. The endogenously determined threshold level of HC is around 2.24 for the whole sample, 2.7 for the resource rich MENA and 1.7 for the resource poor MENA. The mean of HC is around 2.3 as reported by Table 1. As compared to the mean, the threshold is slightly lower for the resource-poor MENA.

According to estimation results in Table 2, there is no significant association between MVA and growth in the low regime including less educated labor observations. On the other hand, an increase in MVA leads to growth in the high regime containing more educated labor episodes. This empirical finding suggests that manufacturing is the engine of growth in economies with better educated labor. For the resource rich MENA economies, the direct impact of human capital is to increase growth in the low regime. On the other hand, for the resource poor MENA economies, human capital encourages growth in both regimes, albeit this impact is much higher in the low regime. This result may indicate that marginal productivity of labor is much higher in economies with lower human capital endowments than the others.

The estimated coefficient for lagged income per capita is positive and significant suggesting the validity of conditional income convergence. An increase in oil prices leads to higher growth. In resource rich MENA economies and the whole sample, an improvement in governance encourages growth mainly by enhancing the investible environment and legal infrastructure including better property rights, transparency and accountability. Financial development is negatively associated with growth for the resource rich MENA economies. This is consistent with the results by Bhattacharrya and Hodler (2014) and Beck (2011). They suggest that a lower level of financial development appears to be the case for resource abundant economies since they meet their liquidity needs with export revenues. Beck (2011, p.24) notes that "financial deepening is less income-elastic in resource-based economies". Kinda et al. (2016) reports that commodity price shocks may impede financial development by increasing the vulnerability to financial crises. Mlachila and Ouedraogo (2020) find that commodity price shocks prevent the development of financial markets. On the other hand, an improvement in financial development expands the availability of funds for financially constrained firms and leads to higher investment and growth for resource poor MENA economies.

### 3.3. Estimation Results: Thresholding Effect of Governance

The conventional literature often suggests that better institutional quality and governance leads to growth mainly by improving legal infrastructure, property rights, transparency and accountability. Better institutional environment can not only be considered as an indicator of well-functioning markets but also lower information asymmetries, risks and higher political accountability according to World Trade Organization (2004). Acemoğlu et al. (2005) notes that institutions are crucially important for growth by affecting the investment decisions for capital, technology and production. The sensitivity of growth to governance and manufacturing may change depending on the governance level. To investigate the potential thresholding effect of institutional quality and governance (GOV) for the effect of MVA and GOV on growth, we consider the following equation:

$$GDPpc_{it}=\alpha_i+\alpha_1 GDPpc_{i,t-1}+\alpha_2 MVA_{it}(GOV_{it}\leq\lambda)+\alpha_3 MVA_{it}(GOV_{it}>\lambda)+\alpha_4 GOV_{it}(GOV_{it}\leq\lambda)+\alpha_5 GOV_{it}(GOV_{it}>\lambda)+\alpha_6 Oil\_Price_t+\alpha_7 FD_{it}+\alpha_8 HC_{it}+e2_{it} \quad (5)$$

**Table 3:** Thresholding Effect of Governance (GOV)

| | Whole Sample | Resource Rich MENA | Resource Poor MENA |
|---|---|---|---|
| | Eq. (5.1) | Eq. (5.2) | Eq. (5.3) |
| $\lambda$ | 0.396 | 0.140 | 0.312 |
| Threshold $F_B$[.] | 2.22[0.94] | 7.95[0.48] | 5.99[0.06] |
| $MVA_{it}$ ($GOV_{it} \leq \lambda$) | -0.001 (0.001) | -0.004* (0.003) | 0.004** (0.002) |
| $MVA_{it}$ ($GOV_{it} > \lambda$) | -0.001 (0.001) | -0.001 (0.002) | 0.003* (0.001) |
| $GOV_{it}$ ($GOV_{it} \leq \lambda$) | 0.004 (0.009) | 0.007 (0.014) | -0.008 (0.009) |
| $GOV_{it}$ ($GOV_{it} > \lambda$) | 0.009 (0.007) | 0.009 (0.008) | 0.021** (0.010) |
| $GDPpc_{i,t-1}$ | 0.963*** (0.018) | 0.894*** (0.028) | 0.909*** (0.031) |
| $Oil\_Price_t$ | 0.018** (0.008) | 0.017 (0.012) | 0.013* (0.008) |
| $FD_{it}$ | 0.013 (0.040) | -0.139** (0.063) | 0.225*** (0.050) |
| $HC_{it}$ | -0.023 (0.014) | -0.032 (0.020) | 0.036* (0.022) |
| Constant | 0.407** (0.152) | 1.183*** (0.272) | 0.555** (0.213) |
| Statistics | N=13 NT=312 $R^2$=0.95 F=652.0[0.00] | N=7 NT=168 $R^2$=0.902 F=175.0[0.00] | N=6 NT=144 $R^2$=0.983 F=958.0[0.00] |

**Notes:** $F_B$ is the bootstrapped F-test based on 1000 replications to test the statistical insignificance of the threshold level and [.] is the p-value of the test. The values in parentheses are the standard errors. *, ** and ***, respectively, denote significance at 10%, 5% and 1% levels. N and NT are, correspondingly, the numbers of countries and the effective number of observations.

Equations (5.1), (5.2) and (5.3) in Table 3 report the estimation results for Equation (5). According to Equation (5.3), institutional quality and governance (GOV) provides data-driven estimated threshold for the effects of MVA and GOV on growth for the resource poor MENA economies. The endogenously estimated threshold level of GOV is around 0.3 with almost 15 percent of the observations in the high regime containing better institutional quality and governance observations. Table 1 reports that the mean of GOV is around 0.91. As compared to the mean, this estimated threshold may be interpreted as low.

The results in equation (5.3) suggest that manufacturing leads to growth in both regimes, albeit with a similar magnitude. On the other hand, the direct effect of GOV on growth is positive and significant in the high regime including better institutional quality episodes. This empirical finding may suggest that there is a certain threshold level of GOV to reap the growth benefits of institutional quality and governance. The estimated coefficient for lagged income per capita provides an empirical support for the validity of conditional income convergence. An increase in oil prices leads to higher growth. Financial development is positively associated with growth. An increase in human capital increases growth.

### 3.4. Estimation Results: Thresholding Effect of Financial Development

Financial development may provide efficient allocation of capital and better risk diversification. Hermes and Lensink (2003) reports that financial development is associated with productivity growth, dissemination of technology and accumulation of capital. As consistent with Szirmai (2012) and Colacchio and Davanzati (2017), financial development may increase investment by alleviating the financial constraints of firms. In this context, we maintain that the impacts of MVA and financial development (FD) on growth may change depending on the FD levels. To study whether FD provides an endogenously estimated threshold for the effects of MVA and FD on growth, we estimate the following equation:

$$GDPpc_{it}=\alpha_i+\alpha_1 GDPpc_{i,t-1}+\alpha_2 MVA_{it}(FD_{it}\leq\lambda)+\alpha_3 MVA_{it}(FD_{it}>\lambda)+\alpha_4 FD_{it}(FD_{it}\leq\lambda)+\alpha_5 FD_{it}(FD_{it}>\lambda)+\alpha_6 Oil\_Price_t+\alpha_7 GOV_{it}+\alpha_8 HC_{it}+e3_{it} \quad (6)$$

Equations (6.1), (6.2) and (6.3) in Table 4 report the estimation results of Eq. (6), respectively, for the whole sample, resource-rich and poor MENA economies. According to the results by Equation (6.3), financial development (FD) provides a data-driven estimated threshold for the resource poor MENA economies. The endogenously estimated threshold level of FD is around 0.18. Considering the mean of FD is around 0.37 as reported by Table 1, this threshold level may be interpreted as slightly lower.

**Table 4:** Thresholding Effect of Financial Development (FD)

| | Whole Sample | Resource Rich MENA | Resource Poor MENA |
|---|---|---|---|
| | Eq. (6.1) | Eq. (6.2) | Eq. (6.3) |
| λ | 0.320 | 0.273 | 0.181 |
| Threshold $F_B$[.] | 16.62[0.33] | 8.89[0.52] | 12.76[0.00] |
| $MVA_{it}$ ($FD_{it} \leq \lambda$) | -0.004** (0.002) | -0.012** (0.004) | 0.013 (0.008) |
| $MVA_{it}$ ($FD_{it} > \lambda$) | 0.001 (0.001) | 0.001 (0.002) | 0.003* (0.001) |
| $FD_{it}$ ($FD_{it} \leq \lambda$) | 0.367*** (0.095) | 0.633** (0.261) | -0.664 (0.835) |
| $FD_{it}$ ($FD_{it} > \lambda$) | 0.082* (0.044) | -0.068 (0.066) | 0.232*** (0.049) |
| $GDPpc_{i,t-1}$ | 0.941*** (0.019) | 0.855*** (0.032) | 0.925*** (0.028) |
| $Oil\_Price_t$ | 0.016** (0.008) | 0.018* (0.011) | 0.014* (0.008) |
| $HC_{it}$ | -0.022 (0.014) | -0.027 (0.020) | 0.045** (0.023) |
| $GOV_{it}$ | 0.006 (0.005) | 0.012* (0.007) | 0.003 (0.006) |
| Constant | 0.561*** (0.158) | 1.496*** (0.302) | 0.416** (0.192) |
| Statistics | N=13 NT=312 $R^2$=0.95 F=684.1[0.00] | N=7 NT=168 $R^2$=0.904 F=180.9[0.00] | N=6 NT=144 $R^2$=0.984 F=1021.8[0.00] |

**Notes:** $F_B$ is the bootstrapped F-test based on 1000 replications to test the statistical insignificance of the threshold level and [.] is the p-value of the test. The values in parentheses are the standard errors. *, ** and ***, respectively, denote significance at 10%, 5% and 1% levels. N and NT are, correspondingly, the numbers of countries and the effective number of observations.

According to the results in Equation (6.3), manufacturing and growth is positively associated in the high regime containing more financially developed observations. This empirical finding may indicate that a certain threshold level of FD is necessary to act as the engine of growth. An improvement in financial development increases growth in economies with more financial development. The estimated coefficient of lagged income per capita is positive and significant suggesting the validity of conditional income convergence. An increase in oil prices leads to higher growth. Better educated labor encourages growth.

**4. Concluding Remarks**

Manufacturing has often been considered as the engine of growth for developed and developing countries including Middle East and North Africa (MENA) economies. This study explains the factors that affect the sensitivity of growth to manufacturing in MENA. We maintain that these factors may be represented with structural domestic conditions (SDC) consisting of human capital, governance and financial development. Our panel fixed effects threshold estimation results by Hansen (1999) strongly suggest that SDC, indeed, provides data-driven estimated thresholds for the impact of MVA on growth.

Considering the heterogeneity in terms of natural resource endowments, we divide the sample into resource-rich and poor MENA economies. Our estimates suggest that SDC provides a data-driven estimated threshold for the resource-poor MENA economies. We find that the impacts of SDC, themselves, lead to growth in economies with better institutional environment and financial development. On the other hand, human capital tends to encourage growth in less educated labor observations. This empirical finding may be consistent with an argument that the marginal contribution of educated labor is much more important for growth in countries with lower levels of human capital. Our results also suggest that there are certain SDC thresholds to act as manufacturing is the engine of growth. In this vein, an increase in manufacturing share in GDP encourages growth for the episodes of SDC exceeding the data-driven estimated threshold levels.

The empirical findings in this study show that investing in human capital, enhancing institutional environment and stimulation of financial development all lead to higher growth. Considering the argument by Kaldor (1966) suggesting manufacturing is the engine of growth, improvement in SDC also increases the effect of manufacturing on growth by providing location advantages.

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